GE GE □□□ Series Service Manual

IS215VPROH2BC

1. Description

IS215VPROH2BC Technical Specifications

2. Specifications

Specification	Value
Frame	**Rate Up to 100 Hz**
Functional	**Acronym/Abbreviation VPRO**
Functional	**Product Description Turbine Emergency Trip or Turbine Protection Board**
MPU	**Input Circuit Sensitivity Min. 27 mV peak at 2 Hz**
Power	**Supply Rating 125 VDC**
Product	**Series Mark VI**
Redundancy	**System Simplex or TMR**
Response	**Time for Solenoids Solenoid L/R Time Constant at 0.1 sec**
Trip	**Solenoids Quantity Six per VPRO (Three per TREG)**

3. Product Information

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About the IS215VPROH2BC

The IS215VPROH2BC model was designed to work as both a turbine-based emergency trip as well as a turbine protection board. It is primarily used as the input/output processor board for the TPRO and TREG boards. The TREG board is the model used when the VPRO is interfacing with the turbine emergency trip board. The TPRO model is used with the VPRO in a turbine protection application. The Mark VI Turbine Control System Series containing this IS215VPROH2BC Turbine Emergency Trip Board, as they are both known at length, exists with a specific set possible application in the control and management systems of General Electric-compatible gas, steam, and wind turbine automated drive assemblies. This must be characterized as quite the significant functional upgrade from the previous industry-standard Mark V Turbine Control System Series of just about the same full extended series title, as the Mark VI Series added the increasingly-important alternative energy-based wind turbine possible functional envrionment onto the gas and steam-based rudimentary settings seen earlier on with the rollout of the Mark V.

Hardware Tips and Specifications

The I/O signal types when the VPRO model is being used with a TREG board are, economizing relays, emergency stop inputs, trip interlock inputs, and trip solenoid drivers. There are also a set number of I/Os per processor. For example, there are seven trip interlock inputs with three trip solenoid drivers per available TREG board. Please note that when the IS215VPROH2BC model is operating as a turbine emergency trip processor board it also has the ability to connect to the TPRO terminal board through an Ethernet cable. When the IS215VPROH2BC board is being used in a protection module application the primary purpose is to ensure that the chosen turbine does not experience any type of overspeed. A vital note needed when operating this model is that it will always be triple redundant and will have three totally separate and independent sections which will be named X, Y, and Z. The model has the capability to shut down one of the sections while the turbine is running without potentially compromising the protection system. Please note that the VPRO board will have its own onboard power supply that will generate between five and twenty-eight volts of direct current from the one-hundred twenty-five volts of direct current which will be taken from the cabinet PDM.

The above-attached information is primarily reminiscent of a service technician-guided visual inspection of the IS215VPROH2BC Turbine Emergency Trip Board PCB itself. While this may be true, this IS215VPROH2BC Turbine Emergency Trip Board device's Mark VI Series is actually relatively well-contextualized online within a wealth of originally-pertinent instructional manual materials. For starters, this IS215VPROH2BC Turbine Emergency Trip Board device has an average solenoid response time of 0.1 second, which of course pertains to the numerous trip solenoid components made available to this IS215VPROH2BC Turbine Emergency Trip Board device's base printed circuit board. On top of this, this IS215VPROH2BC Turbine Emergency Trip Board product offering makes use of trip solenoid circuits that are rated for the NEMA class E creepage level, with the ability to clear a maximum fuse voltage rating of 15 A for this process. This IS215VPROH2BC Turbine Emergency Trip Board unfortunately cannot be defined as the originally-developed product of its specific GE Mark VI Turbine Control System Series functional product role, as that would have to be highlighted as the IS215VPROH2 parent Turbine Emergency Trip Board notably not taking advantage of this IS215VPROH2BC Turbine Emergency Trip Board product's two-fold significant revision table. This IS215VPROH2BC Turbine Emergency Trip Board device's specific revisions include the:

B-rated primary functional product revision

C-rated secondary functional product revision

SPECIFICATIONS

Part No.: IS215VPROH2BC

Manufacturer: General Electric

Country of Manufacture: United States of America (USA)

Temperature: 0 to 60 °C

Frame Rate: Up to 100 Hz

MPU Pulse Rate Range: 2 Hz to 20 kHz

MPU Pulse Rate Accuracy: percent of reading

Product Type: Turbine Protection Board

Availability: In Stock

Series: Mark VI

Functional Description

IS215VPROH2BC is a turbine protection board developed by GE. It is a part of Mark VI control system. The Turbine Protection System comprises the Turbine Protection Board (VPRO) and its associated terminal boards, TPRO and TREG, providing an independent and robust emergency overspeed protection system. The architecture involves triple redundant VPRO boards housed in a separate module from the turbine control system.

Features

Triple Redundant Boards: The boards, designed for triple redundancy, are located within a dedicated Protection Module. This setup ensures a highly reliable and fail-safe emergency overspeed protection system.

Independent Emergency Trip Function: VPRO board in the Protection Module is specifically dedicated to providing the emergency trip function. This ensures that in critical situations, the system has an independent mechanism for initiating emergency shutdowns, contributing to the safety of the turbine operation.

Ethernet Connection for IONet Communications: In addition to its primary functions, the board is equipped with an Ethernet connection for IONet communications with the control

modules. This feature facilitates seamless communication and data exchange between the VPRO and other control components, enhancing the overall efficiency of the turbine protection system.

Trip Solenoid Connection: Up to three trip solenoids can be connected between the TREG and TRPG terminal boards. The TREG terminal board provides the positive side of the 125 V DC power to the solenoids, while the TRPG terminal board supplies the negative side. This dual-sided power supply setup ensures redundancy and resilience in the trip solenoid control system.

Emergency Overspeed and Stop Functions: The board assumes control over the emergency overspeed protection and emergency stop functions. This critical role allows the system to respond swiftly to overspeed conditions or emergencies, ensuring the safe shutdown of the turbine.

Relay Control on TREG: TREG plays a significant role in the system by controlling the 12 relays. Nine of these relays form three groups of three, implementing a voting mechanism for inputs that control the three trip solenoids. This redundancy in relay control enhances the reliability of the protection system.

Power Supply

Each board is equipped with its dedicated on-board power supply. This self-contained power source is designed to ensure the availability of essential voltages for the optimal functioning of the board.

The on-board power supply generates both 5 V DC and 28 V DC. These voltages are critical for powering various components and functionalities within the board, contributing to its comprehensive operation.

The on-board power supply receives its power from the cabinet Power Distribution Module (PDM), drawing 125 V DC. This centralized power source serves as a reliable and consistent foundation, ensuring a stable power supply for the VPRO boards.

With each VPRO board featuring its own on-board power supply, the entire protection module boasts three independent power supplies. This redundancy in power sources enhances the reliability of the system, minimizing the impact of potential power supply failures.

TREG, the terminal board associated with the protection system, is entirely controlled by the boards. This centralized control mechanism streamlines the coordination and operation of the Turbine Protection System.

The only connections between TREG and the control modules involve the J2 power cable and the trip solenoids. This simplified and direct connection scheme enhances the efficiency and reliability of the control architecture.

In simplex systems, a third cable extends from J1 to the TSVO (Turbine Servo Valve Output) terminal board. This additional cable is instrumental in carrying a trip signal to the TSVO terminal board, thereby enabling a servo valve clamp function upon turbine trip.

The inclusion of a trip signal to the TSVO terminal board provides a crucial safety feature in simplex systems. This functionality ensures that, upon turbine trip, a servo valve clamp is initiated, contributing to a controlled and secure shutdown of the turbine.

The VPRO's centralized control over TREG and the simplified connections to control modules contribute to an efficient and streamlined control architecture. This design approach facilitates easy communication and coordination between the various components.

The inclusion of redundant power supplies and the direct control of TREG underscore a focus on redundancy and reliability. These features minimize the risk of system failures, ensuring the continuous and dependable operation of the Turbine Protection System.

The incorporation of a trip signal to the TSVO terminal board in simplex systems demonstrates a commitment to safety. The servo valve clamp function provides an additional layer of protection, ensuring a controlled shutdown in emergency scenarios.

Diagnostics for the Auto Synchronous Function

K25A Relay (synch check) Driver Mismatch Requested State:

This diagnostic message indicates a mismatch between the requested state of the K25A relay (used for synchronous check) driver and its actual state.

The mismatch suggests that the VPRO system is unable to establish a current path from VPRO to the TREx (Terminal Relay Extension) terminal board.

Possible causes for this issue include wiring faults, improper connections, or malfunctioning relay drivers. It may also indicate discrepancies in the configuration or settings of the relay driver.

Addressing this issue involves troubleshooting the relay driver circuitry, verifying the integrity of wiring connections, and ensuring proper configuration of the relay driver settings.

K25A Relay (synch check) Coil Trouble, Cabling to P28V on TTUR:

This diagnostic message indicates trouble with the coil of the K25A relay used for synchronous check, specifically related to cabling between the TREx and the TTUR (Terminal Transfer Unit Remote) terminal boards.

The trouble could stem from various issues, such as an open circuit between the TREx and TTUR terminal boards or the absence of a P28 V power source on the TTUR terminal board.

An open circuit in the cabling or a missing power source can prevent the proper functioning of the K25A relay's coil, leading to synchronization check failures and potential synchronization issues.

Troubleshooting steps involve inspecting the cabling between the TREx and TTUR terminal boards, checking for continuity, and ensuring the availability of the P28 V power source on the TTUR terminal board.